U.S. AIR FORCE

Global Hawk Program Update

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Overview

- **Description**
  - System Requirements
  - Air Vehicle
  - Ground Stations
  - Sensors
- **Recent Activities**
  - Australia Deployment
  - Accomplishments
- **Evolutionary Acquisition**
  - Global Hawk Transformation

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System Description

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System Description

- Global Hawk is an unmanned, high-altitude, long-endurance air vehicle employing a high percentage of commercial off the shelf hardware
- Supports Department of Defense intelligence, surveillance, and reconnaissance missions with integrated sensors
  - Electro-optical (visible)/Infrared Images
  - Synthetic aperture radar (SAR) for all weather
  - Future signals intelligence (SIGINT) capabilities
- Other potential uses for future users

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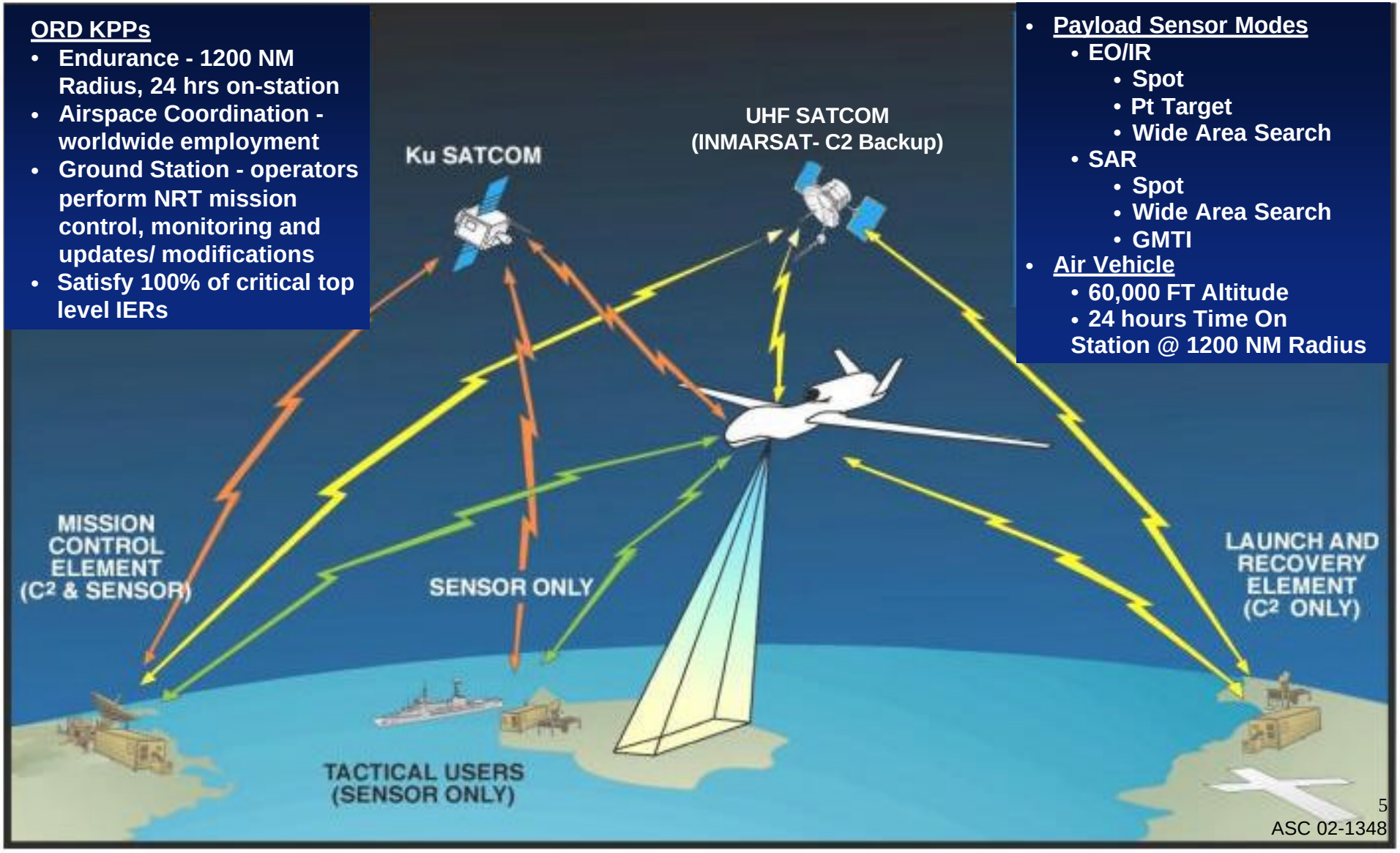
Program Background
Global Hawk System Requirements

ORD KPPs
- Endurance - 1200 NM Radius, 24 hrs on-station
- Airspace Coordination - worldwide employment
- Ground Station - operators perform NRT mission control, monitoring and updates/ modifications
- Satisfy 100% of critical top level IERs

- **Payload Sensor Modes**
  - EO/IR
    - Spot
    - Pt Target
    - Wide Area Search
  - SAR
    - Spot
    - Wide Area Search
    - GMTI
- **Air Vehicle**
  - 60,000 FT Altitude
  - 24 hours Time On Station @ 1200 NM Radius



Global Hawk Air Vehicle
RQ-4A

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GENERAL DESIGN

- **Specifications**
  - **Wing span: 116 ft**
  - **Length: 44 ft**
  - **Height: 15 ft**
- **Performance Goals**
  - **Range: 12,500 nmi**
  - **Approx. Endurance: 35 hrs**
  - **Endurance @1200nm: 24 hrs**
  - **Altitude: 65,000 ft**
  - **True Airspeed: 335 kts**
  - **Gross T/O wt: 25,600 lbs**
  - **Payload wt: 2,000 lbs**
- **Payloads: EO/IR and SAR**
- **Comms: SATCOM: UHF/Ku-Band**
  LOS: UHF and CDL

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Global Hawk Ground Stations

Launch & Recovery Element (LRE) Functions

- Takeoff & Land
- Mission Management
- Mission Planning
- Command & Control
- Command Comms

Mission Control Element (MCE) Functions

- Command & Control
- Interface to Users
- Mission Planning
- Command Comms
- Wideband Comms
- Image Processing
- Image Quality Control
- Mission Management

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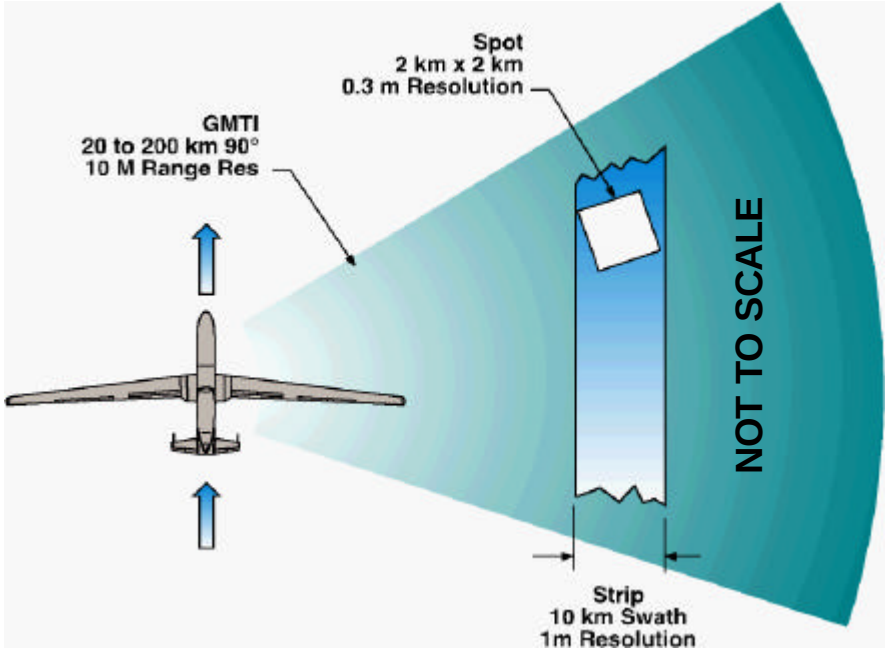
Global Hawk Initial SAR/MTI Sensor Summary Data



Mode Performance

Spot: 20-200km Range
0.3m (1ft) Resolution
2km x 2km Spot (>50km)
1km x 2km Spot (<50km)
1900 Spots/Day

Wide Area Search: 40,000 nmi^2/Day
Squinted/Canted Search w/
High, Medium & Course Resolution & Swath Width
(1.0m, 2.0m & 3.0m Res; 10km, 30km & 50km Swath)

GMTI: 20-200km Range
+/- 45° Field of Regard (FOR)
2 Minute Revisit Rate (Full-Scan)

Radar Characteristics

Mechanically Scanned Array (MSA)
X-Band Frequency
3.0 kW AC/1.6 kW DC
+/- 45° Field of Regard
612 lbs; Air cooled

Data Formats

NITF 2.1
Complex Imagery

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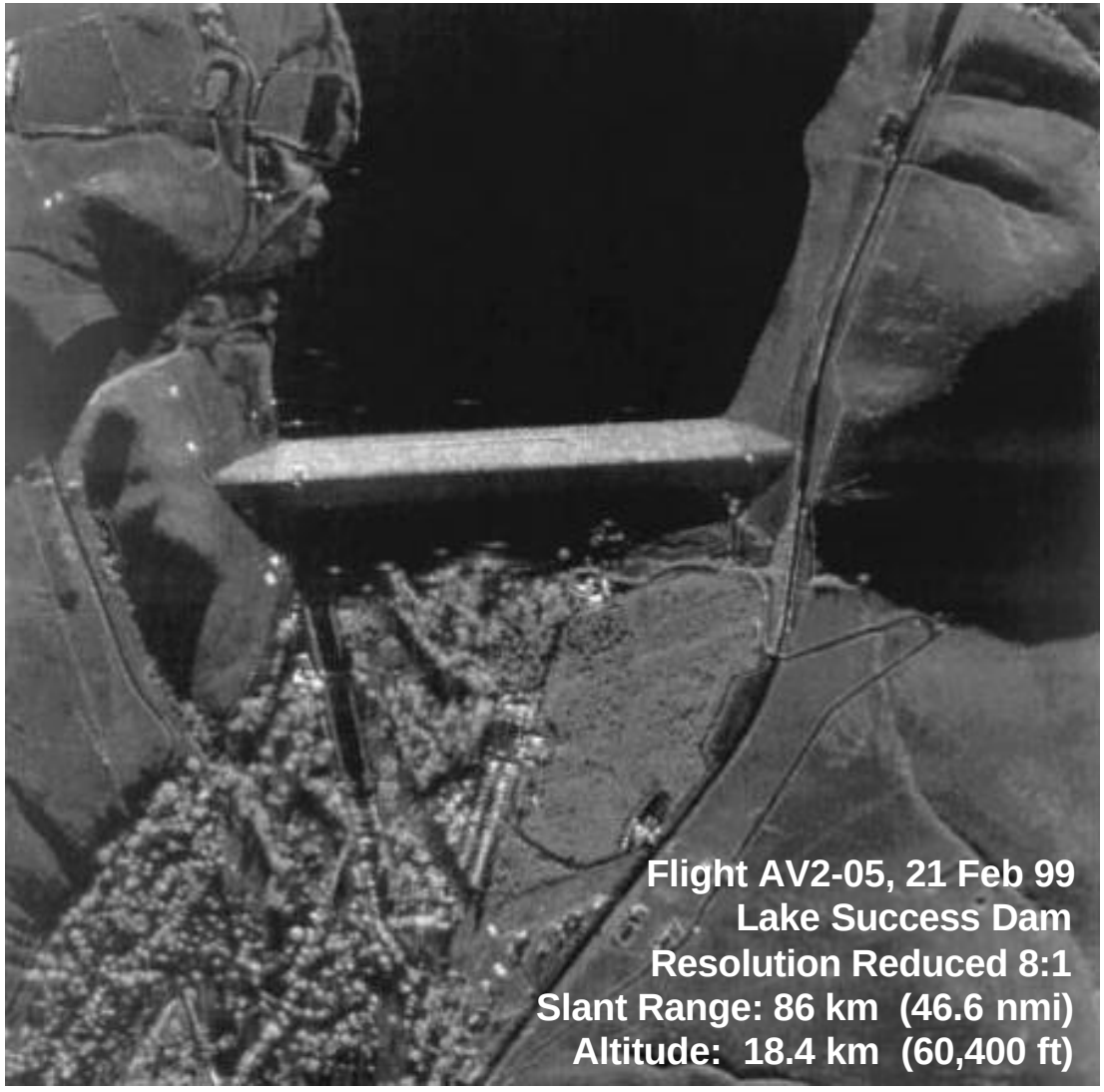
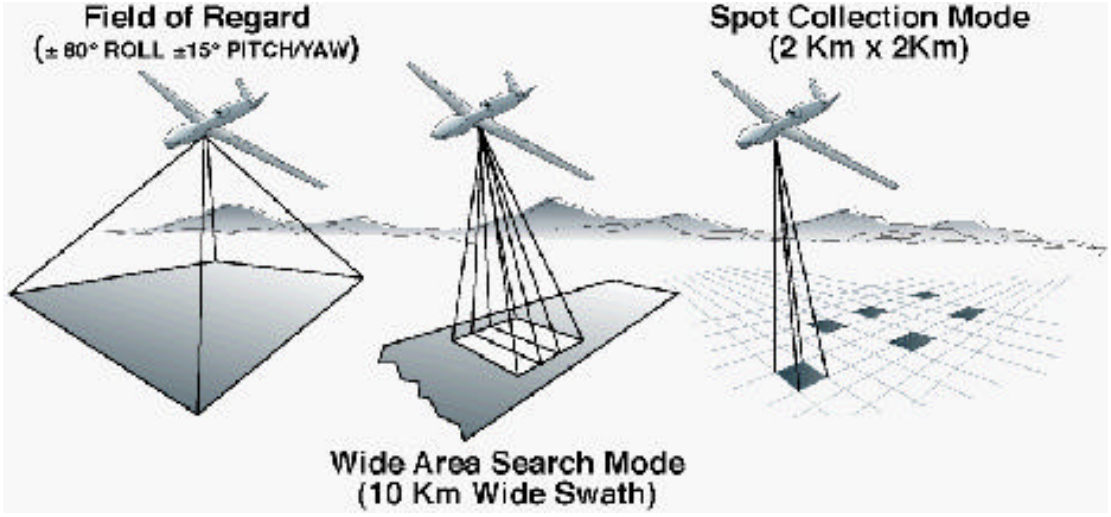
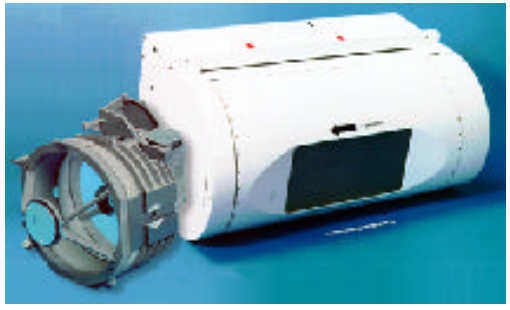
Global Hawk SAR Spot Image



Global Hawk Initial EO/IR Sensor Summary Data





Physical Characteristics
Electro-optical Receiver Unit (ERU)
16ft^3; 300 lbs
300 W AC/600 W DC

Mode Performance

Spot: 1900 Spots/Day
2km x 2km Spot
(EO 10x14 Image Frames)
(IR 7x14 Image Frames)
EO-NIIRS 5.0 @ ~60km
IR-NIIRS 5.0 @ ~30km

Wide Area Search: 10km Swath Width
40,000 nmi^2/day

Data Formats: NITF 2.0

Other Sensor Parameters

Field of Regard	+/-15^o Az; +/-80^o Nadir
Visual Band	0.55 – 0.9 micron
MWIR Band	3.7 – 5.05 micron

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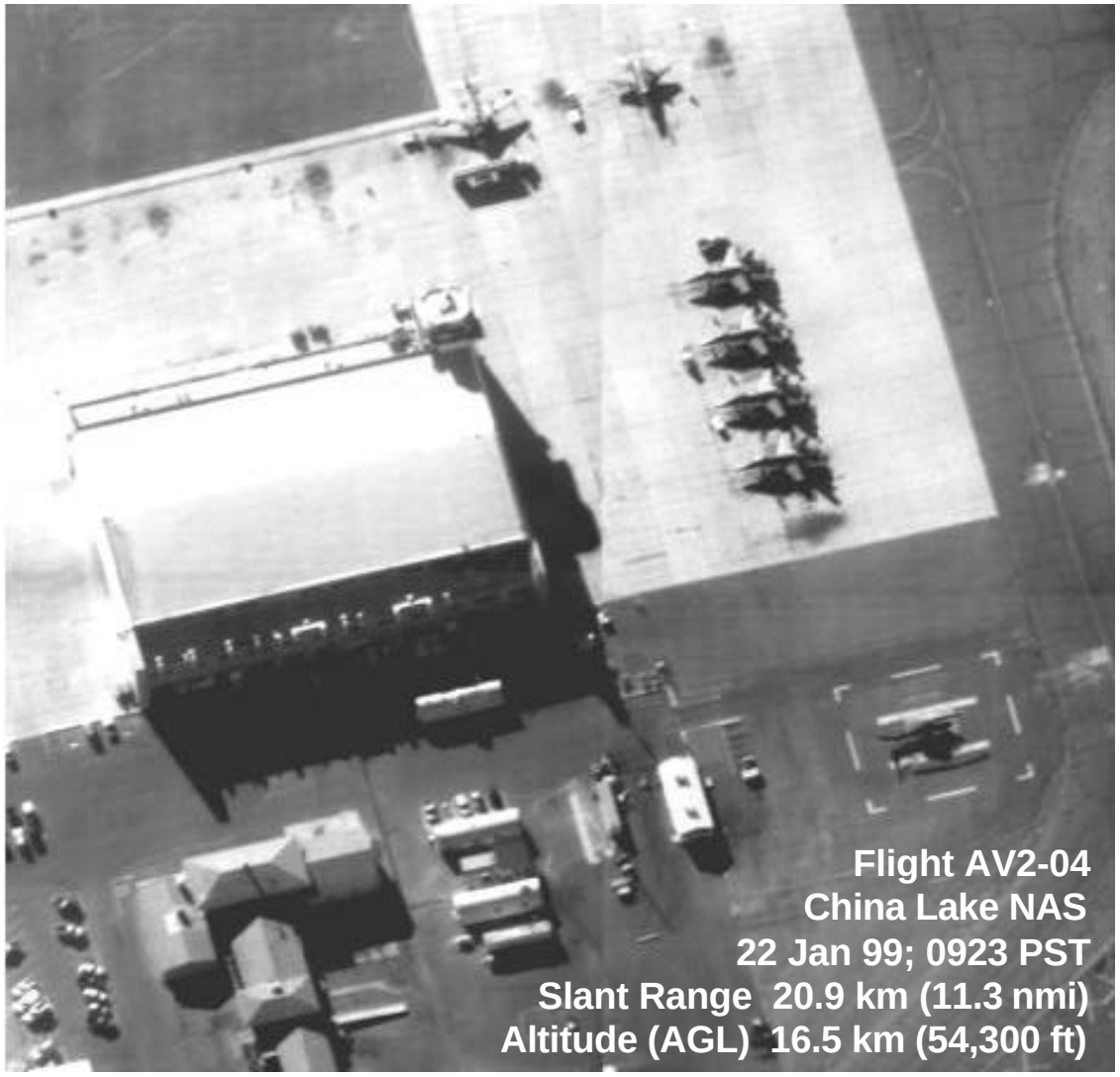
Global Hawk EO Image



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Global Hawk IR Image

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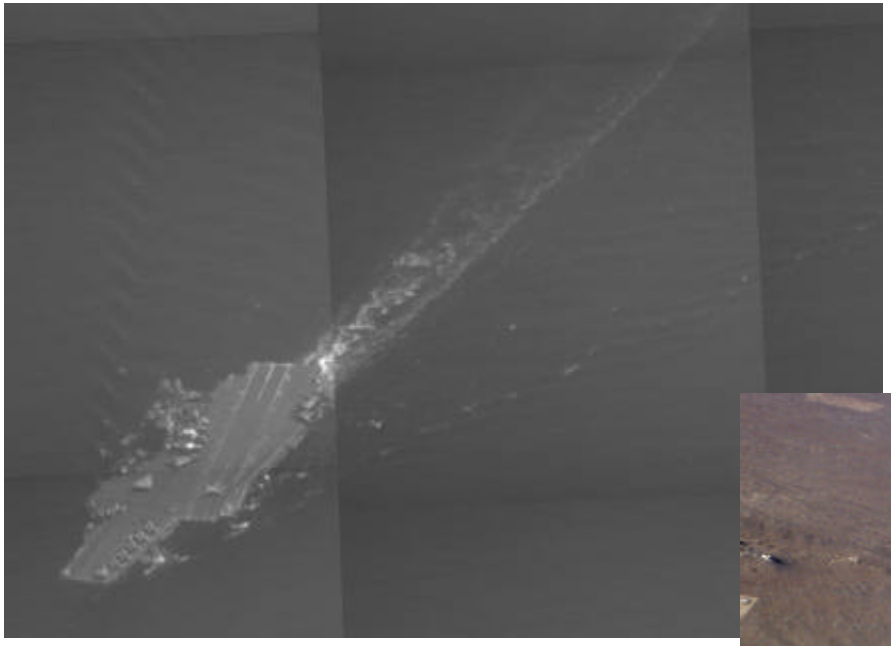
Recent Activities



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Australian Demonstration -- Objectives

- Demonstrate the out-of-CONUS deployment capability
- Demonstrate in Surveillance/Maritime environment
  - Advanced surveillance technology – 11 sensor modes
  - Interoperability with Australian Ground Element (AGE)
  - Electronic Intelligence (ELINT) cueing capability
  - Enhanced operational utility assessment
- Safe operations
- Record Lessons Learned to support future operations

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Australian Deployment Review

- Fully Autonomous Crossing of the Pacific by a UAV
- First Operation of Maritime Surveillance by a Multi-sensor UAV
- First Use of ELINT on the GH Aircraft, Very Successful Cueing Device

- Found Moving and Stationary, Land and Maritime Targets Using All Modes of the Imaging Sensors
- Used IR Sensor for Long Range Target Detection
- IR Sensor Located Troops Using Campfires in the Northern Territory
- Successfully Located, Tracked and Imaged 40’ Fishing Boat With LR-100 and ISAR Mode, Ground Truth Target for Score

SAR Spot Image

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Broken Hill
315638S1412754E

GLOBAL HAWK PR001

UNCLASSIFIED

IMAGE DATE: 23100420ZAPR01

EO Spot

34:48:17 S Lat
138:31:09 E Lon

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Torrens Isle Power Station

GLOBAL HAWK PR-003 UNCLASSIFIED IMAGE DATE: 4/27/01

IR Spot

34:54:56 S Lat
138:35:45 E Lon

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Adelaide Oval

GLOBAL HAWK PR-004 UNCLASSIFIED IMAGE DATE: 4/27/01

Australian Deployment Summary

- Global Hawk considered a very successful deployment
- Met or exceeded all objectives
- Validated Global Hawk deployability and maritime surveillance mission
- Results being closely scrutinized by the US Navy for Navy application

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Accomplishments

- **Fully autonomous flight in only 32 months from go-ahead**
- **FIRST FLIGHT: Feb 28, 1998**
- **TOTAL FLIGHTS: More than 100**
- **TOTAL FLYING HOURS: More than 1500**
- **TOTAL IMAGES TAKEN : More than 10,000**
- **HIGHEST ALTITUDE: 66,400 ft**
- **LONGEST DURATION: 31.5 hours**
- **PAYLOAD INTEROPERABILITY:** Army, Navy, Air Force, Marines, Coast Guard, NATO

- **WORLD RECORDS (as recognized by NAA):**
  - Highest altitude by an autonomous, unmanned jet-powered aircraft: 65,191 ft
  - Longest endurance of an autonomous, unmanned jet-powered aircraft: 30 hrs 24 min
  - First non-stop flight across Pacific Ocean by an autonomous aircraft
- **AWARDS**
  - 2000 Robert J. Collier Trophy
  - 2001 Flight International Award for Military Aviation
  - 2001 Air Force Level Packard Award Winner

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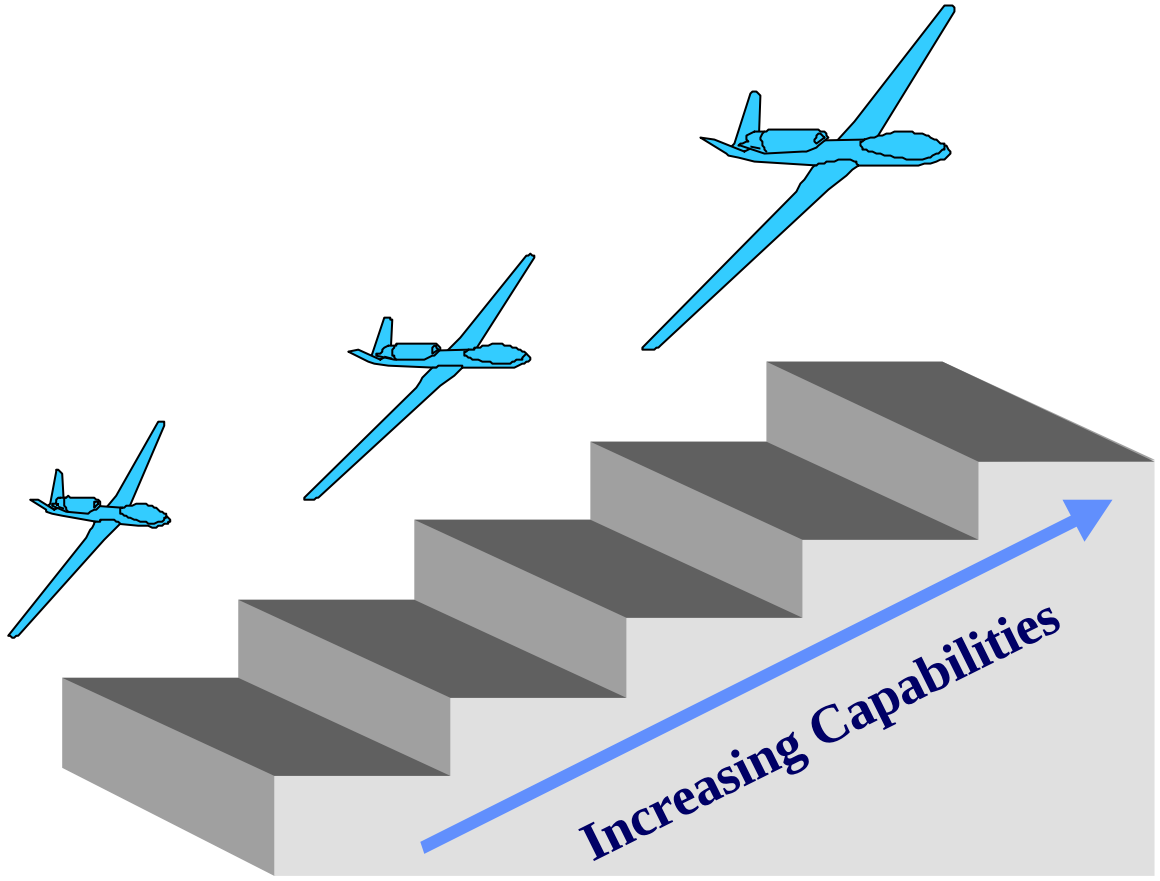
Evolutionary Acquisition



Transformation Program Summary

- Triggers for Transformation Update
- Transformed Program Description

Global Hawk's Spiral Transformation Triggers

- User requirements and budget out pacing formal, validated requirements
  - New missions and upgrades, including SIGINT
  - Experience with ACTD Global Hawks in Operation Enduring Freedom
  - Requirements Working Groups and Requirements Summits
- Rapidly evolving technologic world
  - Deliver more faster to maintain technologic edge
- Original program phased in capability in 2 blocks
  - Block 5/Block 10
  - Full capability (Block 10) scheduled for delivery in FY09
- Real World requirements drove accelerated pace - Accepted moderate risk to develop and produce capability concurrently
  - Pulled "Full" capability back to FY06 and increased production rate
  - Global Hawk, in its most fundamental configuration, can fill vital mission requirements in unique ways

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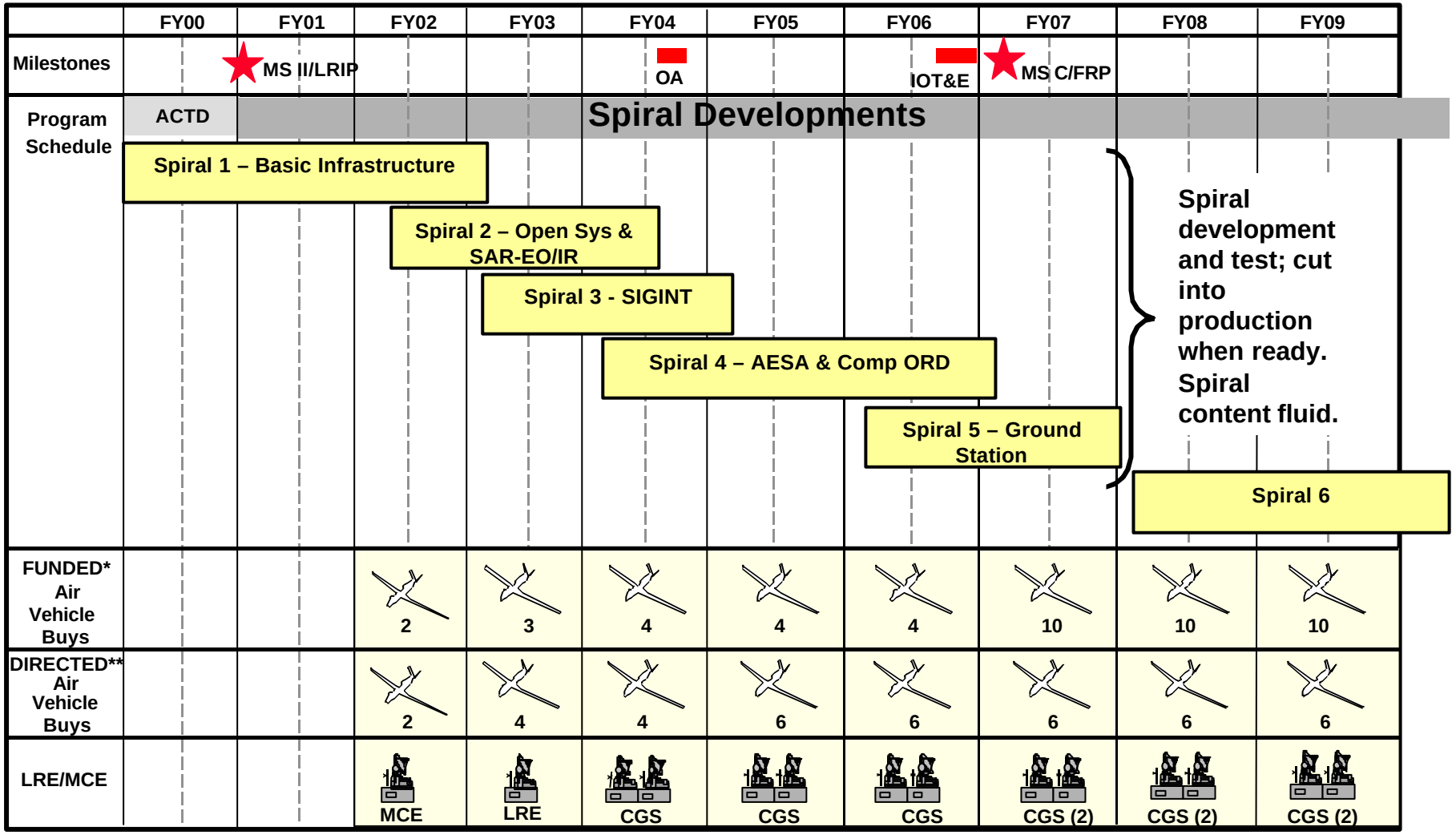
Transformation Program



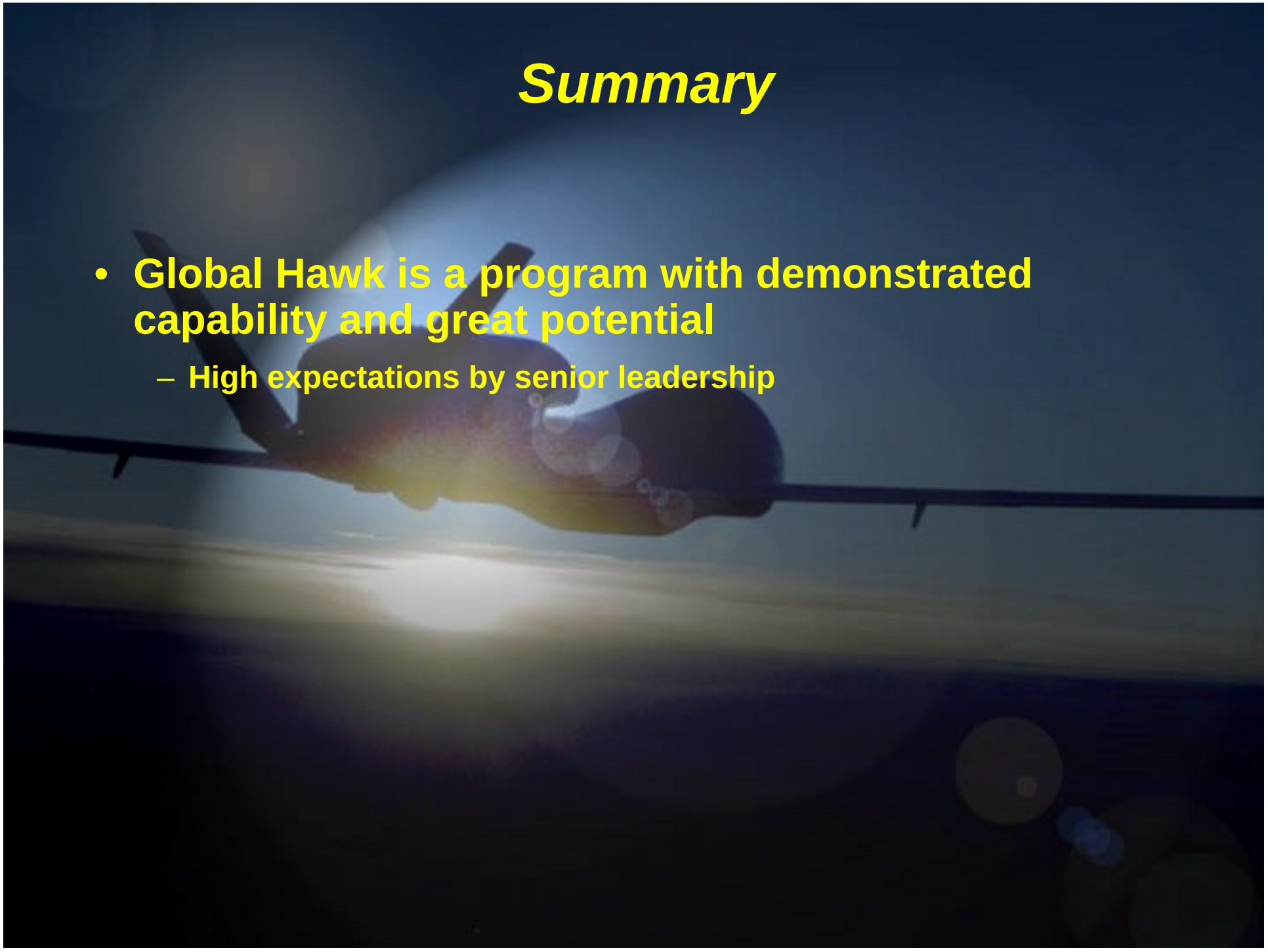
* FY03 PB ** Buy Profile is IAW SAF/XPPI Email dated 29 Jan 02 As of: 25 Feb 02

Spiral Development
Pros and Cons and Challenges

- **The Pros**
  - Incremental capabilities fielded quickly – good for the war fighter!
  - Risks spread across a series of spirals – demonstrated capability to the user
  - Lessons learned in earlier spirals can be added to later spirals
  - Quicker reaction to lessons learned from unplanned operations such as OEF
  - Technology can be incorporated faster – lean agile acquisition at its best

- **The Cons**
  - Won't work if the user won't can't accept an 80% solution in the beginning
  - Inherent flexibility dangerous during periods of budget reductions
    - » Tendency to say "We'll just push that to a later spiral."

- **The Challenges**
  - Test community has to understand a partial capability can equal a success
  - Logistics must find a way to support multiple configurations
  - Communications and Trust must be inherent – what's in the job jar apparent
  - Leadership has to accept an unpredictable future for the program



Summary

- **Global Hawk is a program with demonstrated capability and great potential**
  - **High expectations by senior leadership**